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**1 A framework for modeling human-like driving behaviors for autonomous vehicles in driving simulators**

Talal Al-Shihabi, Ronald R. Mourant

May 2001 **Proceedings of the fifth international conference on Autonomous agents**

Publisher: ACM Press

Full text available:  [pdf\(158.76 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A framework for modeling driver behavior within driving simulators is described in this paper. This framework serves as a basis for building human-like driving behavior models for autonomous vehicles operating within the virtual environment of a driving simulator.

The framework consists of four units, the Perception Unit, the Emotions Unit, the Decision-making Unit (DMU), and the Decision-implementation Unit (DIU). The Perception Unit defines how the model perceives its environment in lo ...

**2 Queueing Network-Model Human Processor (QN-MHP): A computational architecture for multitask performance in human-machine systems**

Yili Liu, Robert Feyen, Omer Tsimhoni

March 2006 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 13 Issue 1

Publisher: ACM Press

Full text available:  [pdf\(1.25 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Queueing Network-Model Human Processor (QN-MHP) is a computational architecture that integrates two complementary approaches to cognitive modeling: the queueing network approach and the symbolic approach (exemplified by the MHP/GOMS family of models, ACT-R, EPIC, and SOAR). Queueing networks are particularly suited for modeling parallel activities and complex structures. Symbolic models have particular strength in generating a person's actions in specific task situations. By integrating the two ...

**Keywords:** Cognitive model, cognition, human information processing, human-computer interaction, user interfaces

**3 Getting graphics in gear: graphics and dynamics in driving simulation**

Rod Deyo, John A. Briggs, Pete Doenges

June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques SIGGRAPH**

'88, Volume 22 Issue 4

**Publisher:** ACM PressFull text available:  pdf(3.63 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Man-in-the-loop simulation uses a person in the control loop to provide feedback to the system operations. Proper operator cueing must be provided to ensure a realistic response. Real-time computer graphics and dynamics both play dominant roles in providing these necessary cues. Dynamics simulation of modern vehicles requires a multi-body non-linear approach for acceptable fidelity of motion. A vehicle can be modeled as a set of linked rigid bodies, whose connections are described by a graph. Re ...

**Keywords:** engineering simulation, parallel algorithms, real-time dynamics, real-time graphics, vehicle simulation, visual systems

**4 Simulation and games: Distinguishing games and simulation games from simulators** 

 Viknashvaran Narayanasamy, Kok Wai Wong, Chun Che Fung, Shri RaiApril 2006 **Computers in Entertainment (CIE)**, Volume 4 Issue 2**Publisher:** ACM PressFull text available:  pdf(283.75 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The advanced computational capabilities in modern personal computers have made it possible for consumers to experience simulations with a high degree of verisimilitude through simulation games (a.k.a. Sims). In recent years, the cross-boundary technology exchange between game and simulation technology, along with other factors, has contributed to the confusion as to what makes a simulation game and what makes a simulator. This article provides a user's and designer's perspective on a definitive ...

**Keywords:** computer simulation games, digital games, serious games, simulators

**5 A quality planning model for distributed multimedia in the virtual cockpit** 

 Mark Claypool, John RiedlFebruary 1997 **Proceedings of the fourth ACM international conference on Multimedia****Publisher:** ACM PressFull text available:  pdf(1.32 MB) Additional Information: [full citation](#), [references](#), [index terms](#)

**Keywords:** communications/networking/VOD applications

**6 Real-world applications: papers: Evolving a real-world vehicle warning system** 

 Nate Kohl, Kenneth Stanley, Risto Miikkulainen, Michael Samples, Rini SheronyJuly 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06****Publisher:** ACM PressFull text available:  pdf(1.24 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Many serious automobile accidents could be avoided if drivers were warned of impending crashes before they occur. Creating such warning systems by hand, however, is a difficult and time-consuming task. This paper describes three advances toward evolving neural networks with NEAT (NeuroEvolution of Augmenting Topologies) to warn about such crashes in real-world environments. First, NEAT was evaluated in a complex, dynamic simulation with other cars, where it outperformed three hand-coded strawman ...

**Keywords:** NEAT, neuroevolution, real world, vehicle

7 Predicting the effects of in-car interfaces on driver behavior using a cognitive architecture



Dario D. Salvucci

March 2001 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Publisher: ACM Press

Full text available:  [pdf\(275.34 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

When designing and evaluating in-car user interfaces for drivers, it is essential to determine what effects these interfaces may have on driver behavior and performance. This paper describes a novel approach to predicting effects of in-car interfaces by modeling behavior in a cognitive architecture. A cognitive architecture is a theoretical frame-work for building computational models of cognition and performance. The proposed approach centers on integrating a user model for the interface w ...

**Keywords:** ACT-R, cellular phones, cognitive architectures, cognitive models, driving, in-car interfaces

8 Human-Computer Interaction in the Control of Dynamic Systems



William B. Rouse

March 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 1

Publisher: ACM Press

Full text available:  [pdf\(2.77 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Modes of human-computer interaction in the control of dynamic systems are discussed, and the problem of allocating tasks between human and computer considered. Models of human performance in a variety of tasks associated with the control of dynamic systems are reviewed. These models are evaluated in the context of a design example involving human-computer interaction in aircraft operations. Other examples include power plants, chemical plants, and ships.

**Keywords:** aircraft, control, dynamic systems, human-computer interaction, mathematical models, system design, task analysis

9 Real-world applications: papers: Evolution of driving agent, remotely operating a scale model of a car with obstacle avoidance capabilities



Ivan Tanev, Michal Joachimczak, Katsunori Shimohara

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06**

Publisher: ACM Press

Full text available:  [pdf\(783.43 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present an approach for evolutionary design of an agent, remotely operating a scale model of a car running in a fastest possible way. The agent perceives the environment from a video camera and conveys its actions to the car via standard radio control transmitter. In order to cope with the video feed latency we propose an anticipatory modeling in which the agent considers its current actions based on the anticipated intrinsic (rather than currently available, outdated) state of the car and it ...

**Keywords:** anticipatory modeling, driving agent, feedback latency, genetic algorithms

10 Assistive robotics: Spatial routines for a simulated speech-controlled vehicle

 Stefanie Tellex, Deb Roy

March 2006 **Proceeding of the 1st ACM SIGCHI/SIGART conference on Human-robot interaction HRI '06**

Publisher: ACM Press

Full text available:  pdf(630.38 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We have defined a lexicon of words in terms of *spatial routines*, and used that lexicon to build a speech controlled vehicle in a simulator. A spatial routine is a script composed from a set of primitive operations on occupancy grids, analogous to Ullman's visual routines. The vehicle understands the meaning of context-dependent natural language commands such as "Go across the room." When the system receives a command, it combines definitions from the lexicon according to the parse structu ...

**Keywords:** language grounding, situated language processing, spatial language, spatial routines, visual routines, wheelchair

11 Parallel and distributed simulation

 Richard M. Fujimoto

December 1995 **Proceedings of the 27th conference on Winter simulation**

Publisher: ACM Press

Full text available:  pdf(884.98 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

12 An asynchronous integration and event detection algorithm for simulating multi-agent hybrid systems



Joel M. Esposito, Vijay Kumar

October 2004 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 14 Issue 4

Publisher: ACM Press

Full text available:  pdf(299.01 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A simulation algorithm is presented for multi-agent hybrid systems---systems consisting of many sets of nonsmooth differential equations---such as systems involving multiple rigid bodies, vehicles, or airplanes. The differential equations are partitioned into coupled subsystems, called "agents"; and the conditions which trigger the discontinuities in the derivatives, called "events", may depend on the global state vector. Such systems normally require significant computational resources to si ...

**Keywords:** Event detection, hybrid systems, multi-agent systems, numerical integration

13 A Criticality Analysis of Clustering in Superscalar Processors

Pierre Salverda, Craig Zilles

November 2005 **Proceedings of the 38th annual IEEE/ACM International Symposium on Microarchitecture MICRO 38**

Publisher: IEEE Computer Society

Full text available:  pdf(448.82 KB) Additional Information: [full citation](#), [abstract](#)

 Publisher Site

Clustered machines partition hardware resources to circumvent the cycle time penalties incurred by large, monolithic structures. This partitioning introduces a long inter-cluster

forwarding latency and the potential for load imbalance, both of which degrade IPC and thus counter the cycle time benefits of clustering. We show that program dataflow can be mapped to clustered machines so as to achieve an IPC rivaling that of an equivalent monolithic machine. That is, the IPC penalties observed by ex ...

**14 Advanced tutorials: Parallel simulation: parallel and distributed simulation systems**

Richard M. Fujimoto

December 2001 **Proceedings of the 33nd conference on Winter simulation**

Publisher: IEEE Computer Society

Full text available:  [pdf\(255.36 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Originating from basic research conducted in the 1970's and 1980's, the parallel and distributed simulation field has matured over the last few decades. Today, operational systems have been fielded for applications such as military training, analysis of communication networks, and air traffic control systems, to mention a few. This tutorial gives an overview of technologies to distribute the execution of simulation programs over multiple computer systems. Particular emphasis is placed on synchro ...

**15 Parallel and distributed simulation**



Richard M. Fujimoto

December 1999 **Proceedings of the 31st conference on Winter simulation: Simulation--a bridge to the future - Volume 1**

Publisher: ACM Press

Full text available:  [pdf\(118.56 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**16 Collision detection and proximity queries**



Sunil Hadap, Dave Eberle, Pascal Volino, Ming C. Lin, Stephane Redon, Christer Ericson

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available:  [pdf\(11.22 MB\)](#) Additional Information: [full citation](#), [abstract](#)

This course will primarily cover widely accepted and proved methodologies in collision detection. In addition more advanced or recent topics such as continuous collision detection, ADFs, and using graphics hardware will be introduced. When appropriate the methods discussed will be tied to familiar applications such as rigid body and cloth simulation, and will be compared. The course is a good overview for those developing applications in physically based modeling, VR, haptics, and robotics.

**17 What makes virtual systems a reality**



Farid Mamaghani

May 1994 **ACM SIGGRAPH Computer Graphics**, Volume 28 Issue 2

Publisher: ACM Press

Full text available:  [pdf\(705.58 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

If posed as a question, one possible answer to the title is: "sufficient resources." Given enough resources, sometimes referred to as infinite dollars, it is plausible that one can realize a life-like virtual environment, or the ultimate simulation system. For most of us, however, the fact remains that resources (time, money, processing power) are limited. Our objective then becomes to engineer solutions that satisfy the intended use of the product while remaining within bounds of the resource c ...

**18**

**Synchronizing simulations in distributed interactive simulation**

Sandra Cheung, Margaret Loper

December 1994 **Proceedings of the 26th conference on Winter simulation**

Publisher: Society for Computer Simulation International

Full text available:  pdf(763.91 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

19 [Link and channel measurement: A simple mechanism for capturing and replaying wireless channels](#) 

 Glenn Judd, Peter Steenkiste

August 2005 **Proceeding of the 2005 ACM SIGCOMM workshop on Experimental approaches to wireless network design and analysis E-WIND '05**

Publisher: ACM Press

Full text available:  pdf(6.06 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Physical layer wireless network emulation has the potential to be a powerful experimental tool. An important challenge in physical emulation, and traditional simulation, is to accurately model the wireless channel. In this paper we examine the possibility of using on-card signal strength measurements to capture wireless channel traces. A key advantage of this approach is the simplicity and ubiquity with which these measurements can be obtained since virtually all wireless devices provide the req ...

**Keywords:** channel capture, emulation, wireless

20 [Translating discrete-time simulink to lustre](#) 

 Stavros Tripakis, Christos Sofronis, Paul Caspi, Adrian Curic

November 2005 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 4 Issue 4

Publisher: ACM Press

Full text available:  pdf(827.48 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a method of translating discrete-time Simulink models to Lustre programs. Our method consists of three steps: type inference, clock inference, and hierarchical bottom-up translation. In the process, we explain and formalize the typing and timing mechanisms of Simulink. The method has been implemented in a prototype tool called S2L, which has been used in the context of a European research project to translate two automotive controller models provided by Audi.

**Keywords:** Code generation, Lustre, Simulink, embedded software

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steering wheel angle and look ahead

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MF Land, DN Lee - Nature, 1994 - nature.com

Where we **look** when we steer. ... information from the changing pattern of the road **ahead**. ...

We have made simultaneous recordings of **steering-wheel angle** and drivers ...

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### [A general framework for automatic \*\*steering control\*\*: system analysis](#)

S Patwardhan, HS Tan, J Guldner - American Control Conference, 1997. Proceedings of the 1997, 1997 - ieeexplore.ieee.org

... long vehicle, effectively resulting in a **look-ahead** system ... paper that the extension of **look-down** systems ... 1. The front **wheel steering angle** is realized by an ...

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### [Steering control of high speed vehicles: dynamic \*\*look ahead\*\* and yawrate feedback](#)

C Chen, HS Tan - Decision and Control, 1998. Proceedings of the 37th IEEE ..., 1998 - ieeexplore.ieee.org

... In other words, the transfer function from the front **wheel steering angle** to lateral acceleration at the **look-ahead** point becomes a constant gain. ...

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### [Development of an automated \*\*steering\*\* vehicle based on roadway magnets-a case study of mechatronic ... - group of 2 »](#)

HS Tan, J Guldner, S Patwardhan, C Chen, B Boulier - Mechatronics, IEEE/ASME Transactions on, 1999 - ieeexplore.ieee.org

... performance, in particular, when a **look-down** lateral ... Minimum **steering** actuator specifications have, thus, been ... **wheel** or 0.4% of road **wheel angle**, whichever is ...

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ED Dickmanns, BD Mysliwetz - Pattern Analysis and Machine Intelligence, IEEE Transactions ..., 1992 - ieeexplore.ieee.org

... while driving on the road with constant speed and **steering wheel** turn rates ... that horizontal and vertical curvature relative to the visual **look-ahead** range (to ...

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### [... design of a \*\*look-down\*\* feedback adaptive controller for the lateral control of front-wheele-steering ... - group of 4 »](#)

SB Choi - Vehicular Technology, IEEE Transactions on, 2000 - ieeexplore.ieee.org

... vision sensor has the advantage of **look-ahead**, which makes ... the yaw rate as , front **wheel steering angle** as , cornering ... CHOI: THE DESIGN OF A LOOK-DOWN FEEDBACK ...

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### [Robust Automatic \*\*Steering\*\* Control for Look-Down Reference Systems with Front and Rear Sensors - group of 3 »](#)

J Guldner, W Sienel, HS Tan, J Ackermann, S ... - IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY, 1999 - ieeexplore.ieee.org

... For the augmented **look-down** reference system as ... are also shown: vehicle side slip angle between the ... and vehicle yaw rate The front **wheel steering angle** is the ...

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J Kosecka, R Blasi, CJ Taylor, J Malik - Proc. Intelligent Transportation Systems Conference, Boston, 1997 - cis.upenn.edu

... the vehicle at some **look- ahead** distance, are ... this setting we explore the role of **lookahead**, its relation ... frame f front **wheel steering angle** commanded **steering** ...

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[Preview based control of a tractor trailer using DGPS for preventing road departure accidents - group of 2 »](#)

V Morellas, T Morris, L Alexander, M Donath - Intelligent Transportation System, 1997. ITSC 97. IEEE ..., 1997 - ieeexplore.ieee.org

... **Steering Wheel Angle** Error Table 1: Nomenclature for the integrated preview based **steering controller**. ... on a curve when using a longer **look ahead** distance is ...

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Z Zomotor, U Franke - Intelligent Transportation System, 1997. ITSC 97. IEEE ..., 1997 - ieeexplore.ieee.org

... L, where q denotes the clothoid parameter and L the **look-ahead** distance. ... available, the yaw rate could also be estimated using the **steering wheel angle** with an ...

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